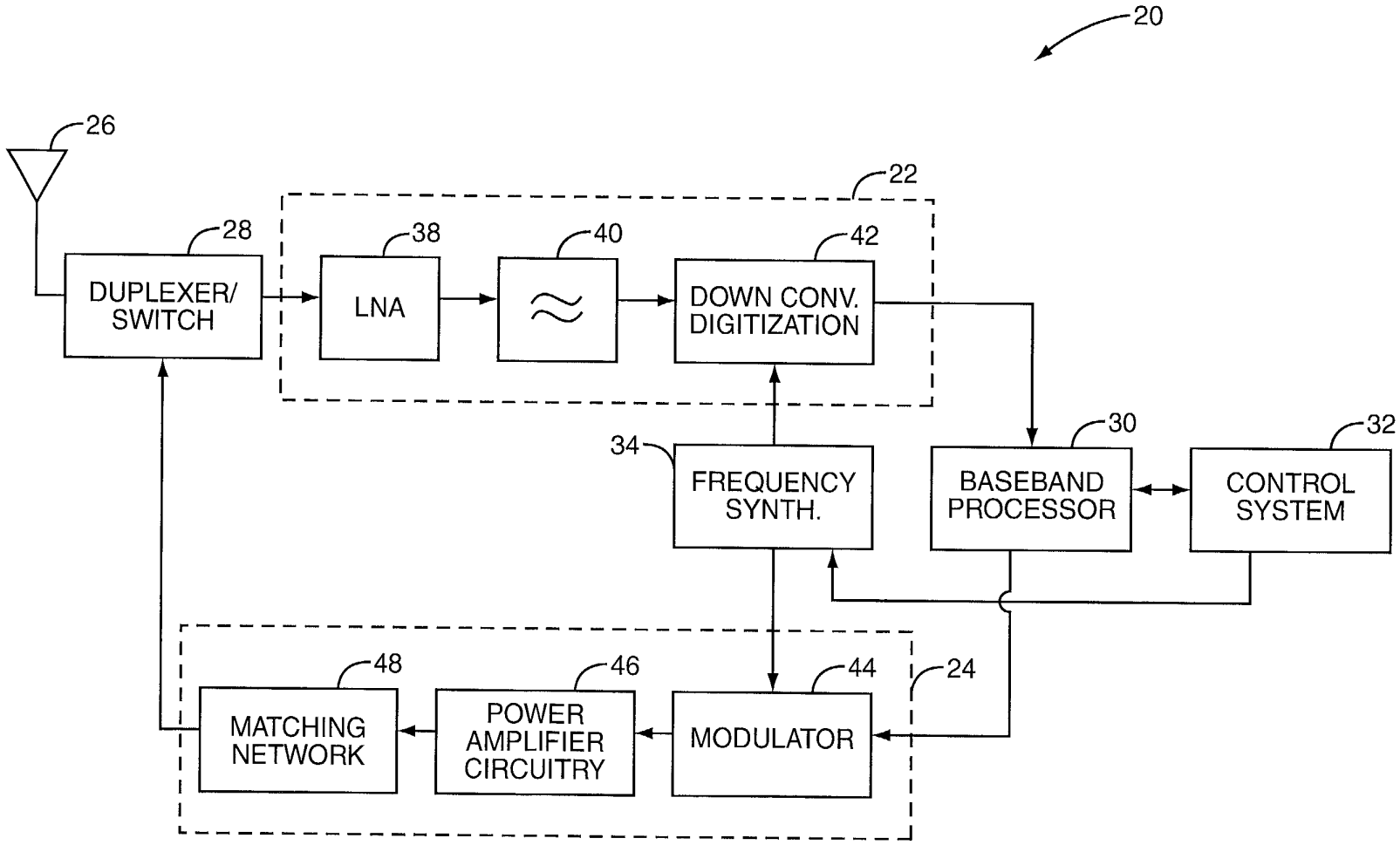
20
26
22
28
38
40
42
DUPLEXER/ SWITCH
LNA
DOWN CONV. DIGITIZATION
34
30
32
FREQUENCY SYNTH.
BASEBAND PROCESSOR
CONTROL SYSTEM
48
46
44
24
MATCHING NETWORK
POWER AMPLIFIER CIRCUITRY
MODULATOR

FIG. 1

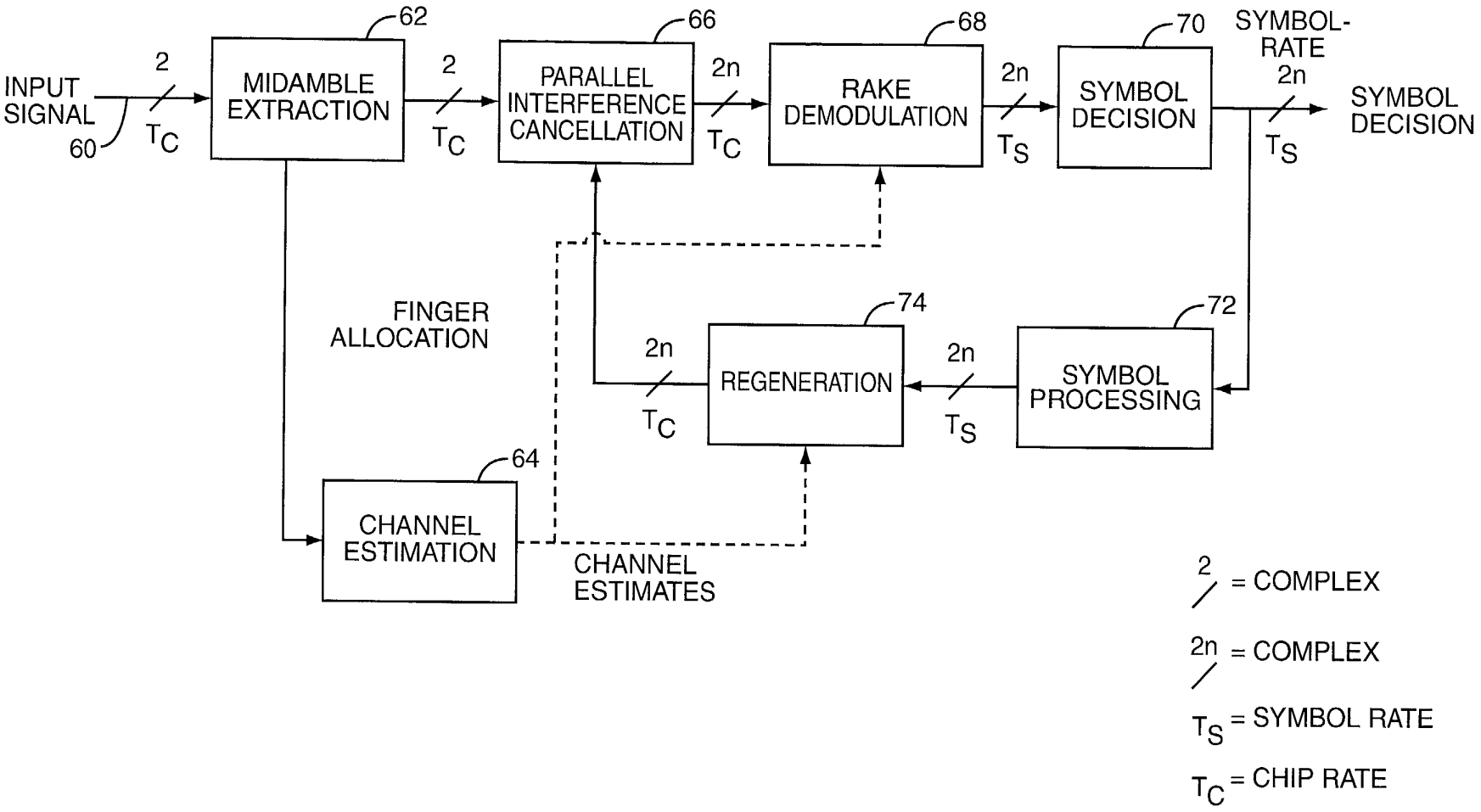
INPUT SIGNAL
60
2
T_C
MIDAMBLE EXTRACTION
62
2
T_C
PARALLEL INTERFERENCE CANCELLATION
66
2n
T_C
RAKE DEMODULATION
68
2n
T_S
SYMBOL DECISION
70
SYMBOL-RATE
2n
T_S
SYMBOL DECISION
FINGER ALLOCATION
2n
T_C
REGENERATION
74
2n
T_S
SYMBOL PROCESSING
72
CHANNEL ESTIMATION
64
CHANNEL ESTIMATES
2 = COMPLEX
2n = COMPLEX
T_S = SYMBOL RATE
T_C = CHIP RATE

FIG. 2

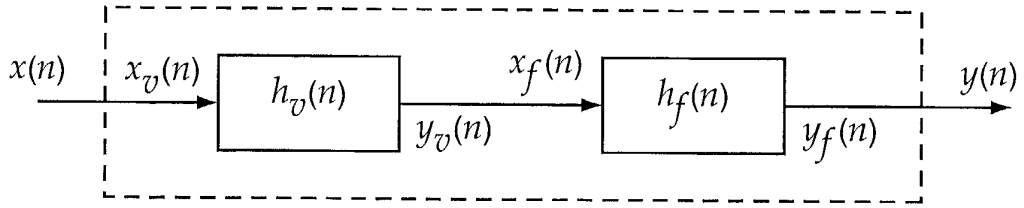
x(n)
$x_v(n)$
$h_v(n)$
$y_v(n)$
$x_f(n)$
$h_f(n)$
$y_f(n)$
y(n)

FIG. 3

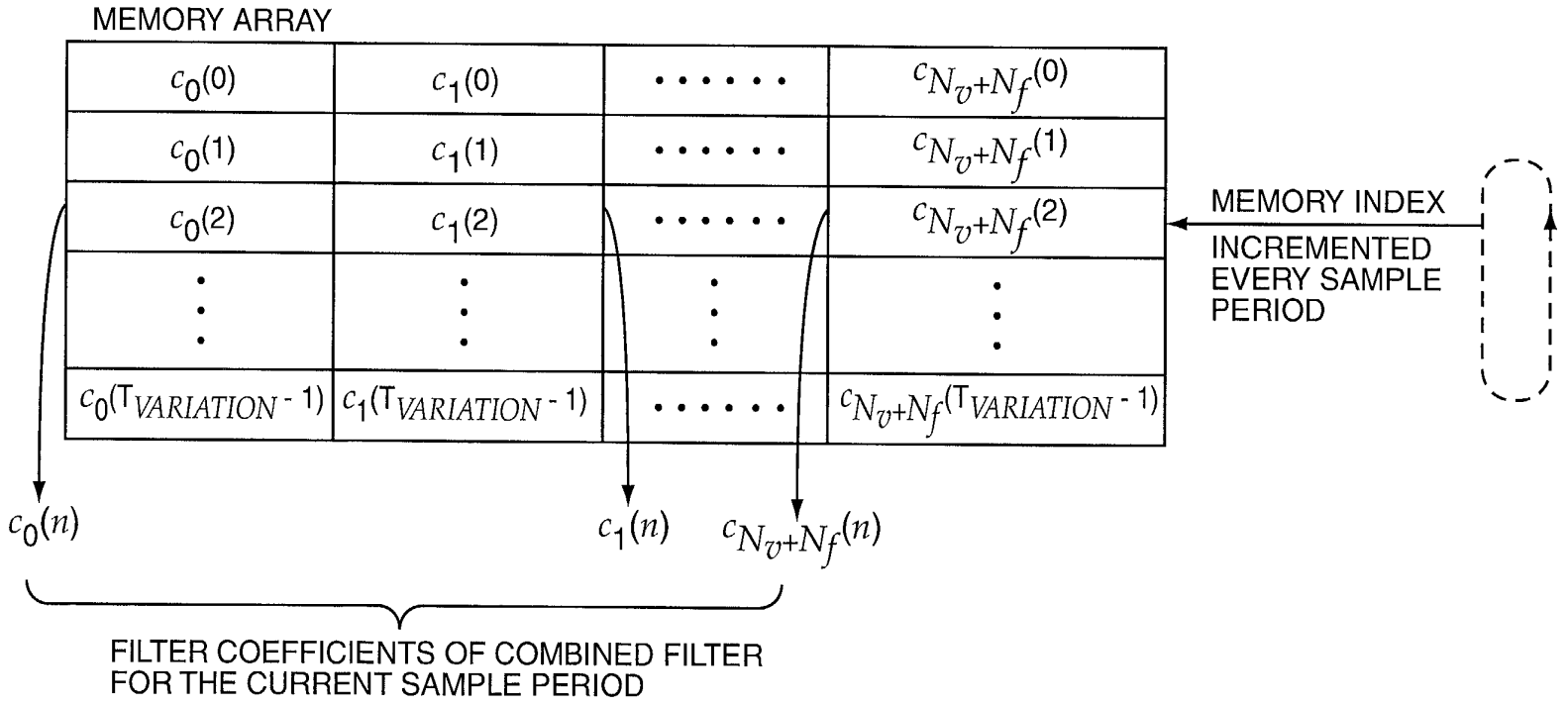
MEMORY ARRAY
$c_0(0)$ $c_1(0)$ ..... $c_{N_v+N_f}(0)$
$c_0(1)$ $c_1(1)$ ..... $c_{N_v+N_f}(1)$
$c_0(2)$ $c_1(2)$ ..... $c_{N_v+N_f}(2)$
$c_0(T_{VARIATION} - 1)$ $c_1(T_{VARIATION} - 1)$ ..... $c_{N_v+N_f}(T_{VARIATION} - 1)$
MEMORY INDEX
INCREMENTED EVERY SAMPLE PERIOD
$c_0(n)$
$c_1(n)$
$c_{N_v+N_f}(n)$
FILTER COEFFICIENTS OF COMBINED FILTER FOR THE CURRENT SAMPLE PERIOD

FIG. 4

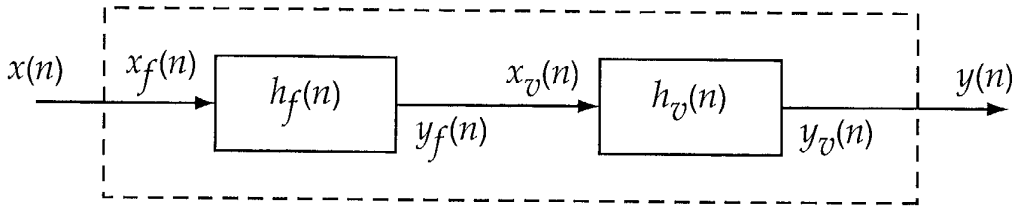
x(n)
x_f(n)
h_f(n)
y_f(n)
x_v(n)
h_v(n)
y_v(n)
y(n)

FIG. 5

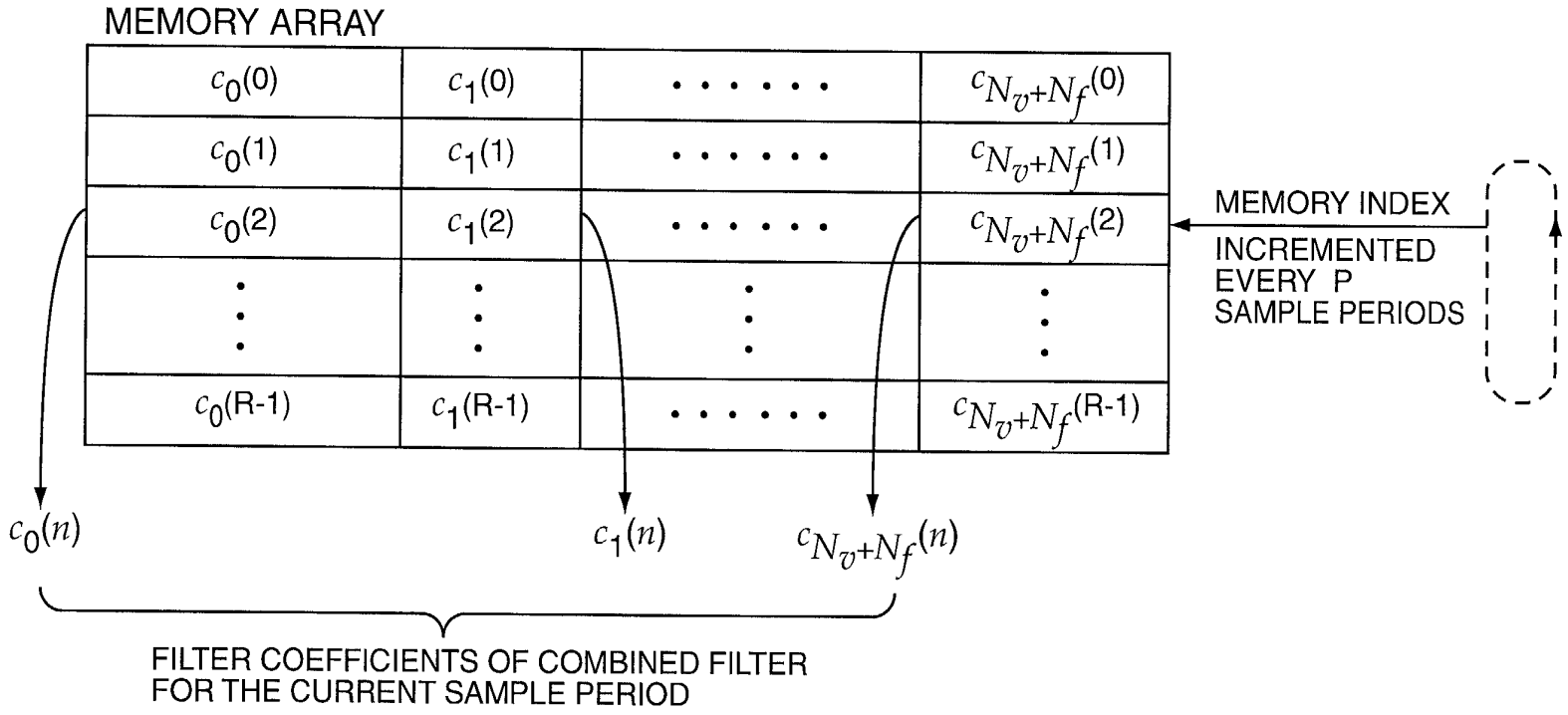
MEMORY ARRAY
c0(0)
c1(0)
cNv+Nf(0)
c0(1)
c1(1)
cNv+Nf(1)
c0(2)
c1(2)
cNv+Nf(2)
c0(R-1)
c1(R-1)
cNv+Nf(R-1)
MEMORY INDEX
INCREMENTED EVERY P SAMPLE PERIODS
c0(n)
c1(n)
cNv+Nf(n)
FILTER COEFFICIENTS OF COMBINED FILTER FOR THE CURRENT SAMPLE PERIOD

FIG. 6

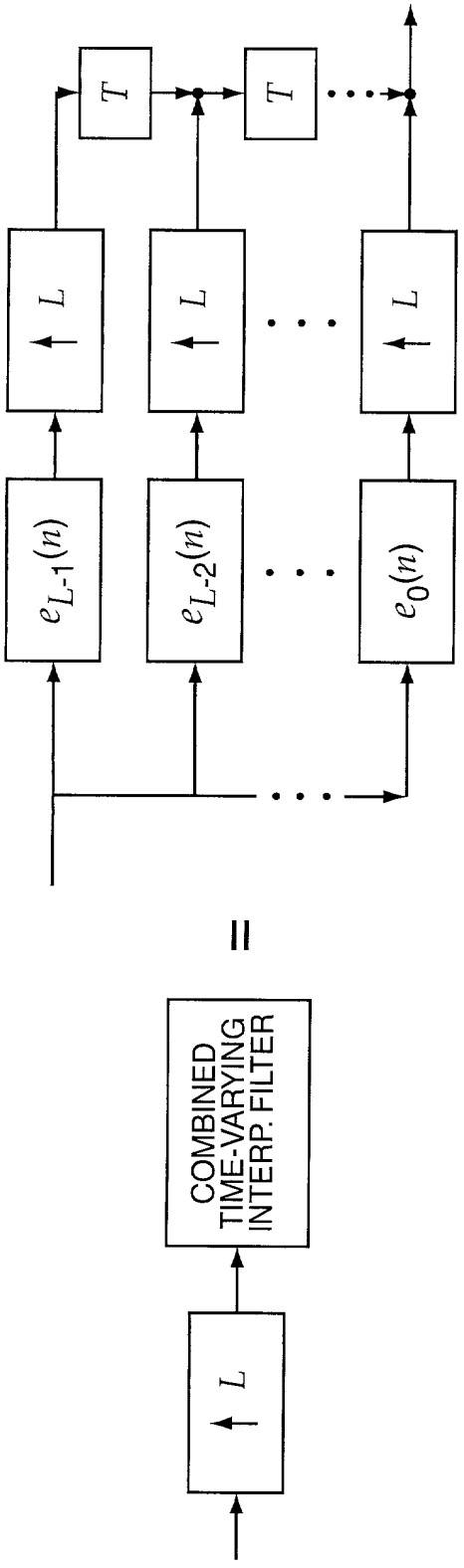
COMBINED TIME-VARYING INTERP. FILTER
L
=
L
L
L
T
T
$e_{L-1}(n)$
$e_{L-2}(n)$
$e_0(n)$

FIG. 7

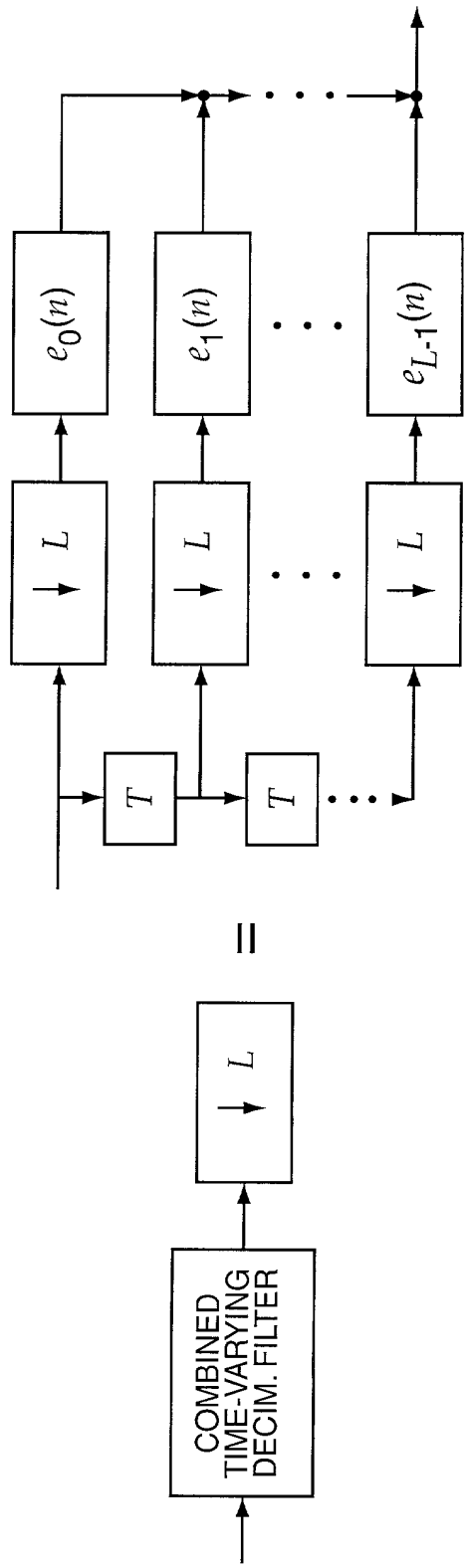
COMBINED TIME-VARYING DECIM. FILTER
L
=
L
L
L
T
T
$e_0(n)$
$e_1(n)$
$e_{L-1}(n)$

FIG. 8

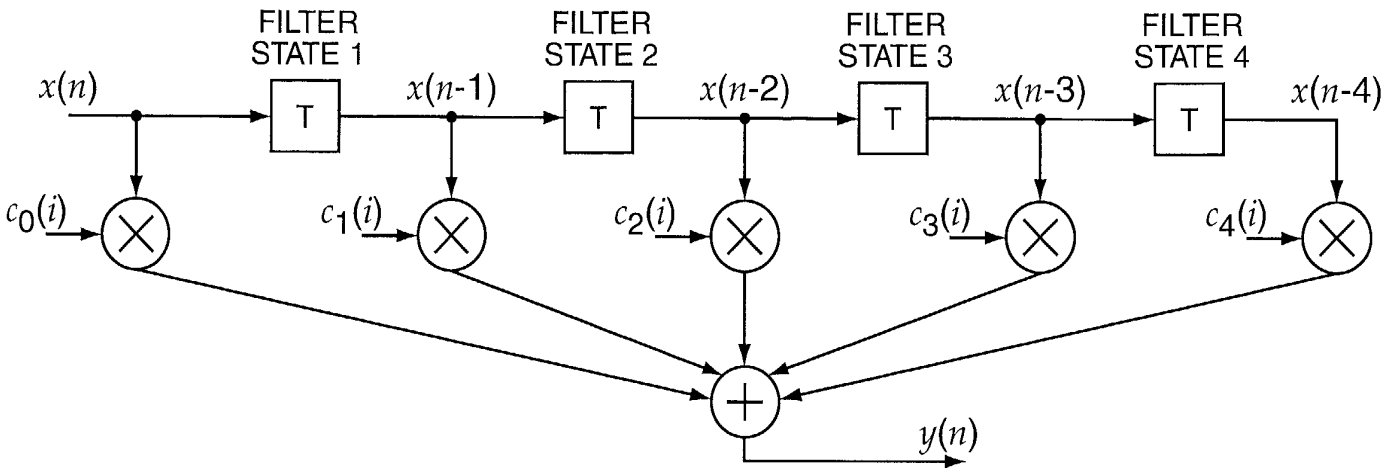

FIG. 9

MEMORY ARRAY

$c_0(0)$	$c_1(0)$	$c_2(0)$	$c_3(0)$	$c_4(0)$
$c_0(1)$	$c_1(1)$	$c_2(1)$	$c_3(1)$	$c_4(1)$
$c_0(2)$	$c_1(2)$	$c_2(2)$	$c_3(2)$	$c_4(2)$
$c_0(3)$	$c_1(3)$	$c_2(3)$	$c_3(3)$	$c_4(3)$
$c_0(4)$	$c_1(4)$	$c_2(4)$	$c_3(4)$	$c_4(4)$
$c_0(5)$	$c_1(5)$	$c_2(5)$	$c_3(5)$	$c_4(5)$

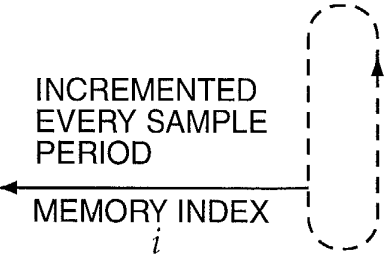

FIG. 10

EXAMPLE FILTER OUTPUTS FOR FOURTH-ORDER COMBINED FILTER

TIME INDEX n	INPUT $x(n)$	FILTER STATE 1 $x(n\text{-}1)$	FILTER STATE 2 $x(n\text{-}2)$	FILTER STATE 3 $x(n\text{-}3)$	FILTER STATE 4 $x(n\text{-}4)$	MEMORY INDEX i	OUTPUT $y(n)$
0	A	0	0	0	0	0	$A \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + 0 \cdot c_3(0) + 0 \cdot c_4(0)$
1	B	A	0	0	0	1	$B \cdot c_0(1) + A \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + 0 \cdot c_4(1)$
2	C	B	A	0	0	2	$C \cdot c_0(2) + B \cdot c_1(2) + A \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$
3	D	C	B	A	0	3	$D \cdot c_0(3) + C \cdot c_1(3) + B \cdot c_2(3) + A \cdot c_3(3) + 0 \cdot c_4(3)$
4	E	D	C	B	A	4	$E \cdot c_0(4) + D \cdot c_1(4) + C \cdot c_2(4) + B \cdot c_3(4) + A \cdot c_4(4)$
5	F	E	D	C	B	5	$F \cdot c_0(5) + E \cdot c_1(5) + D \cdot c_2(5) + C \cdot c_3(5) + B \cdot c_4(5)$
6	G	F	E	D	C	0	$G \cdot c_0(0) + F \cdot c_1(0) + E \cdot c_2(0) + D \cdot c_3(0) + C \cdot c_4(0)$
7	H	G	F	E	D	1	$H \cdot c_0(1) + G \cdot c_1(1) + F \cdot c_2(1) + E \cdot c_3(1) + D \cdot c_4(1)$

FIG. 11

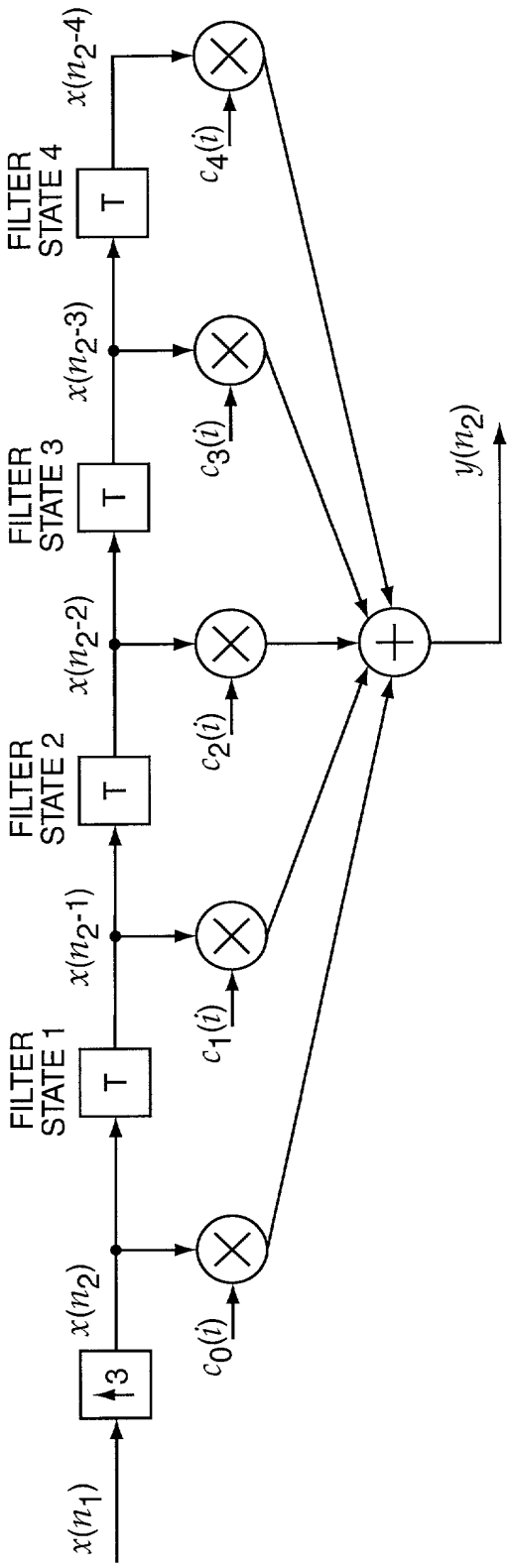
$x(n_1)$
↑3
$x(n_2)$
$c_0(i)$
FILTER STATE 1
T
$x(n_2\text{-}1)$
$c_1(i)$
FILTER STATE 2
T
$x(n_2\text{-}2)$
$c_2(i)$
FILTER STATE 3
T
$x(n_2\text{-}3)$
$c_3(i)$
FILTER STATE 4
T
$x(n_2\text{-}4)$
$c_4(i)$
$y(n_2)$

FIG. 12

EXAMPLE FILTER OUTPUTS FOR FOURTH-ORDER INTERPOLATION FILTER

TIME n_2	INPUT $x(n_1)$	INPUT $x(n_2)$	FILTER STATE 1 $x(n_2\text{-}1)$	FILTER STATE 2 $x(n_2\text{-}2)$	FILTER STATE 3 $x(n_2\text{-}3)$	FILTER STATE 4 $x(n_2\text{-}4)$	MEMORY INDEX i	OUTPUT $y(n_2)$
0	A	A	0	0	0	0	0	$A \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + 0 \cdot c_3(0) + 0 \cdot c_4(0)$
1	—	0	A	0	0	0	1	$0 \cdot c_0(1) + A \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + 0 \cdot c_4(1)$
2	—	0	0	A	0	0	2	$0 \cdot c_0(2) + 0 \cdot c_1(2) + A \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$
3	B	B	0	0	A	0	3	$B \cdot c_0(3) + 0 \cdot c_1(3) + 0 \cdot c_2(3) + A \cdot c_3(3) + 0 \cdot c_4(3)$
4	—	0	B	0	0	A	4	$0 \cdot c_0(4) + B \cdot c_1(4) + 0 \cdot c_2(4) + 0 \cdot c_3(4) + A \cdot c_4(4)$
5	—	0	0	B	0	0	5	$0 \cdot c_0(5) + 0 \cdot c_1(5) + B \cdot c_2(5) + 0 \cdot c_3(5) + 0 \cdot c_4(5)$
6	C	C	0	0	B	0	0	$C \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + B \cdot c_3(0) + 0 \cdot c_4(0)$
7	—	0	C	0	0	B	1	$0 \cdot c_0(1) + C \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + B \cdot c_4(1)$
8	—	0	0	C	0	0	2	$0 \cdot c_0(2) + 0 \cdot c_1(2) + C \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$

FIG. 13

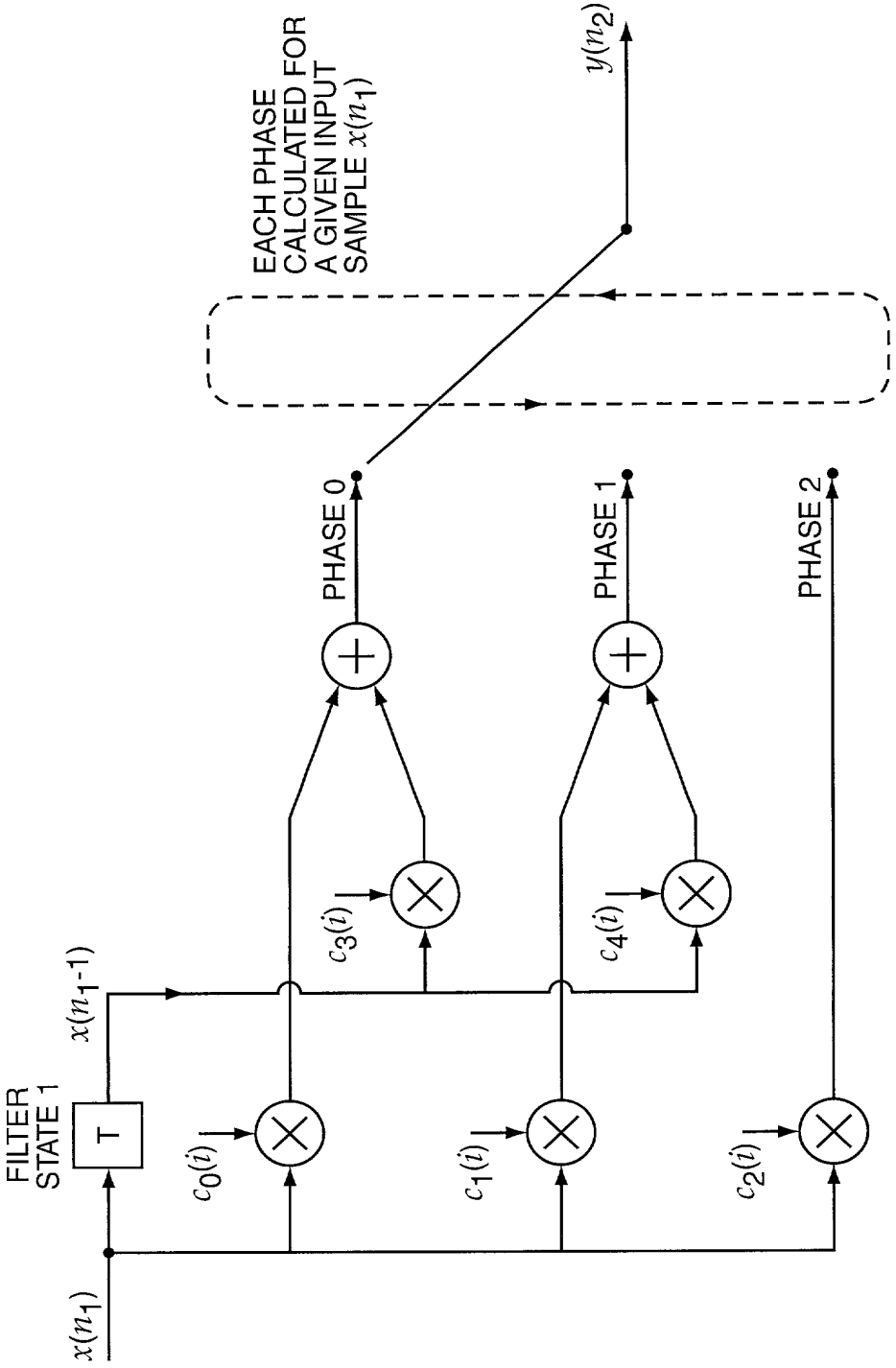
$x(n_1)$
FILTER STATE 1
T
$x(n_1\text{-}1)$
$c_0(i)$
$c_1(i)$
$c_2(i)$
$c_3(i)$
$c_4(i)$
PHASE 0
PHASE 1
PHASE 2
EACH PHASE CALCULATED FOR A GIVEN INPUT SAMPLE $x(n_1)$
$y(n_2)$

FIG. 14

EXAMPLE FILTER OUTPUTS FOR FOURTH-ORDER POLYPHASE INTERPOLATION FILTER

TIME n_2	INPUT $x(n_1)$	FILTER STATE 1 $x(n_1\text{-}1)$	SELECTED PHASE	MEMORY INDEX i	OUTPUT $y(n_2)$
0	A	0	0	0	$A \cdot c_0(0) + 0 \cdot c_3(0)$
1	–	0	1	1	$A \cdot c_1(1) + 0 \cdot c_4(1)$
2	–	0	2	2	$A \cdot c_2(2)$
3	B	A	0	3	$B \cdot c_0(3) + A \cdot c_3(3)$
4	–	A	1	4	$B \cdot c_1(4) + A \cdot c_4(4)$
5	–	A	2	5	$B \cdot c_2(5)$
6	C	B	0	0	$C \cdot c_0(0) + B \cdot c_3(0)$
7	–	B	1	1	$C \cdot c_1(1) + B \cdot c_4(1)$
8	–	B	2	2	$C \cdot c_2(2)$

FIG. 15

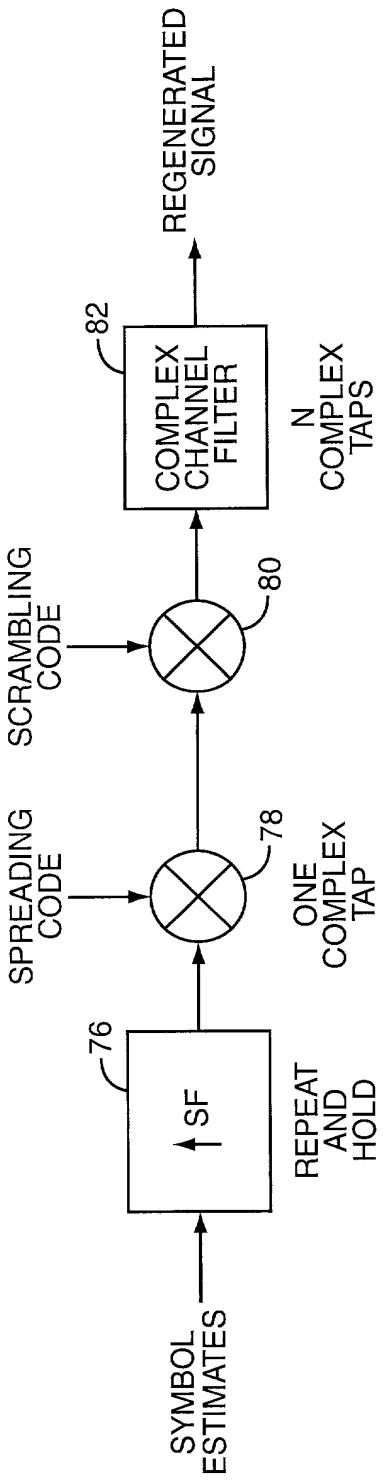

FIG. 16
PRIOR ART

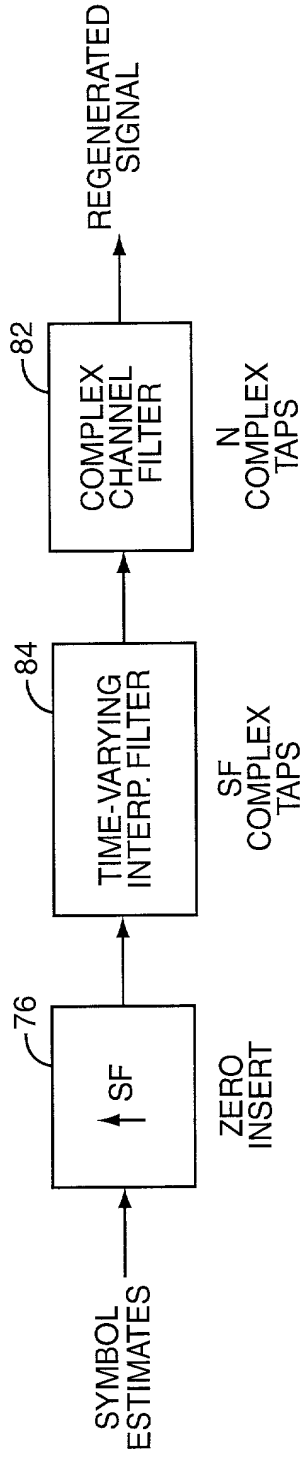

FIG. 17
PRIOR ART